REMARKS

Claims 1, 2, 4, 5, 7, 8, 10, 11, 13 and 14 are pending in this application. In the non-final Office Action, the Examiner rejected claims 1, 7, 13 and 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,463,618 ("*Furukawa*") in view of allegedly Admitted Prior Art ("APA") and in further view of "Continuous Speech Recognition in Noise Using Spectral Subtraction and HMM Adaptation," 1994 ("*Flores*"); rejected claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over *Furukawa* in view of APA, *Flores* and in further in view of U.S. Patent No. 5,475,791 ("*Schalk*"); and rejected claims 4, 5, 10, and 11 under 35 U.S.C. § 103(a) as being unpatentable over *Furukawa*, *Flores,* APA, *Schalk* and further in view of "Signal Conditioning Techniques for Robust Speech Recognition," 1996 ("*Rahim*") and allegedly well known prior art.

Applicants request the Examiner's reconsideration these claims in light of the remarks that follow.

Rejection of Independent claims 1, 7, 13 and 14 under 35 U.S.C. § 103(a)

Applicants respectfully traverse the rejection of claim 1 under 35 U.S.C. § 103(a) as being unpatentable over *Furukawa* in view of the alleged APA and *Flores*. In the Office Action, the Examiner apparently admits that *Furukawa* and the alleged APA fail to disclose "means for determining a spectrum for each frame by performing the Fourier transform on said acoustic echo-canceled signal; means for successively determining a spectrum mean for each frame based on the spectrum obtained; and means for successively subtracting the spectrum mean from the spectrum calculated for each frame from said acoustic echo-canceled signal to remove additive noise of an unknown source," as recited in claim 1.

Thus, while *Furukawa* may be useful in some noise environments to detect voice, *Furukawa* does not recognize that benefits of combining the *Furukawa* techniques with techniques known to be particularly useful in environments with noise components from unknown sources. (Office Action, p. 4:6-7.)

Applicants' specification, unlike *Furukawa*, describes the previously unrecognized benefits of combining NLMS-VAD methods with continuous spectrum subtraction (CSS) technology. CSS technology is known to be useful in lessening the effects of noise components from unknown sources. The Applicants, unlike others in the art, recognized that combining NLMS-VAD methods with CSS processing can suppress acoustic echo (unsteady additive noise) not cancelled by NLMS-VAD method alone.

Figure 7A of the Applicants' application shows an exemplary spectrogram of a signal including additive noises and speech data. This data shows noise data from a car running at a speed of 60 km/h in a town, with an audio device playing pop music in the car, and a woman talking in the car. In this exemplary spectrogram, the pop music represents acoustic echo. Figure 7G shows that, after applying the NLMS-VAD method, a portion of the acoustic echo signal (surrounded by an ellipse in Figure 7E) is nearly cancelled. As seen in Figure 7G, however, other components of the acoustic echo—such as the elements at the frequency of 1 kHz located at time 0.9 seconds—cannot be cancelled by the NLMS-VAD method.

The Applicants, unlike *Furukawa*, realized the beneficial effects of combining the CSS and NLMS-VAD methods. Figure 10 of the application, for example, shows an exemplary spectrogram obtained by applying CSS processing to a signal with acoustic echo cancelled using NLMS-VAD processing. As illustrated, for example, in Figure 10B,

the CSS method cancels the remaining acoustic echo components from the signal. The Applicants in this application, unlike *Furukawa*, discovered that combing the CSS method and the NLMS-VAD method enables the suppression of echo remaining from the use of the NLMS-VAD method alone.

The Examiner argues that the failure of *Furukawa* is somehow cured by *Flores*. *Flores* discloses a continuous spectrum subtraction (CSS) scheme that performs a Fourier transform, determines a spectrum average, and subtracts the spectrum average from the spectrum. (Office Action, p. 4:7-1, citing *Flores* p. 409 and Fig. 1.) This technique is useful for voice detection in environments that have noise components from unknown sources. But there is nothing in *Flores* to teach, suggest, or motivate any combination with *Furukawa*. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990, emphasis added).

In the Office Action, the Examiner argues "one of ordinary skill in the art of speech and signal processing would clearly recognize the advantages to modifying a speech processing system so as to provide processing for the input speech signal which includes components of the acoustic echo signal from a know source, the voice, and an additive background noise from an unknown source, as well known in the art, and to implement checking, in each frame, whether or not the voice is included in the desired signal." (Office Action, pp. 6-7, emphasis added.) But the Examiner fails to show any prior art that recognizes, suggests, or teaches this combination. Having appreciated that both known and unknown noise sources need to be considered, Applicants included both in their

invention. However, there is no basis to conclude that the knowledge of one of ordinary skill in the art would lead to the same realization. To the contrary, none of *Furukawa*, the alleged APA, or *Flores* disclose or suggest that combination.

Applicants respectfully submit that the Examiner's motivation for combining the references is based on the Applicants' disclosure. Such reliance amounts to improper hindsight reconstruction and cannot properly support a rejection under 35 U.S.C. § 103(a). In the Office Action, the Examiner argues that the proposed combination of *Furukawa*, the alleged APA and *Flores* is not based on improper hindsight. (Office Action, p. 8:5-11.) Applicants note, however, that the Examiner's argument appears to be stock language offered without any analysis with regard to present application or consideration of the Applicants' arguments. (*See,* M.P.E.P. §707.07(f), ¶ 7.37.03.)

As noted by the Examiner, citing *In re McLaughlin*, 444 F.2d 1392, 170 USPQ 209 (CCPA 1971), reconstruction may be proper "so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure." But in this case, as Applicants have pointed out above, the applied references do not disclose or suggest the claimed combination and to not even disclose or suggest the specific recitations of "determining a spectrum for each frame by performing the Fourier transform on said acoustic echo-canceled signal" and "successively subtracting the spectrum mean from the spectrum calculated for each frame from said acoustic echo-canceled signal" (emphasis added), as recited in claim 1. Applicants respectfully submit that the Examiner's motivation for combining the applied references is gleaned using knowledge from the Applicant's specification at, for example, pages 36:12-39-19 and Figure 12.

In light of the arguments above, Applicants respectfully submit that *Furukawa*, the alleged APA, and *Flores* fail to support a rejection of claim 1 under 35 § U.S.C. § 103(a) and that the Examiner has failed to provide a proper motivation for combining these references. Applicants therefore respectfully request that the Examiner reconsider and withdraw the rejection of claim 1, and allow the claim.

Claims 7, 13 and 14, although of different scope than claim 1, recite similar features to those of claim 1. For example, claim 7 recites "determining a spectrum for each frame by performing the Fourier transform on said acoustic echo-canceled signal" and "successively subtracting the spectrum mean from the spectrum calculated for each frame from said acoustic echo-canceled signal to remove additive noise of an unknown source." And, claim 13 recites, "applying a continuous spectral substitution algorithm to each frame of said acoustic echo-cancelled signal to remove an unknown noise source from said acoustic echo-cancelled signal." Accordingly, for at least the reasons discussed above with regard to claim 1, *Furukawa*, the APA, and *Flores* taken alone or in combination, cannot support a *prima facie* case of obviousness for claims 7, 13 and 14. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claims 7, 13 and 14 under 35 § U.S.C. § 103(a) and allow these claims.

Rejection of claims 2 and 8 under 35 U.S.C. § 103(a)

Applicants respectfully traverse the rejection of claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over *Furukawa*, APA, *Flores*, and further in view of *Schalk*. Claims 2 and 8 depend from independent claims 1 and 7, respectively, and thus include all the recitations of their respective independent claims. Accordingly, for at least the reasons

provided for claims 1 and 7, *Furukawa*, APA, and *Flores* do not teach or suggest the above-noted features of claims 2 and 8.

The Examiner relies cites *Schalk* for allegedly disclosing the use of an echo-cancelled signal for speech recognition. (Office Action, p. 5). However, as admitted by the Examiner in the previous Office Action mailed March 10, 2006, *Schalk* does not disclose "determining a spectrum mean or subtracting a spectrum mean from the spectrum" (*see* p. 5:1-2). Accordingly, *Schalk* cannot teach or suggest "determining a spectrum for each frame by performing the Fourier transform on said acoustic echo-canceled signal" and "successively subtracting the spectrum mean from the spectrum calculated for each frame from said acoustic echo-canceled signal," as recited in claim 1. *Schalk*, therefore, fails to overcome the above-noted deficiencies of *Furukawa*, the APA, and *Flores*. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claims 2 and 8 under 35 § U.S.C. § 103(a) and allow these claims.

Rejection to Claims 4-5 and 10-11 under 35 U.S.C. § 103(a)

Applicants respectfully traverse the rejection of claims 4, 5, 10, and 11 under 35 U.S.C. § 103(a) as being unpatentable over *Furukawa*, APA, *Flores*, *Schalk* and further in view of *Rahim*, and allegedly well known prior art.

As noted above, *Furukawa*, APA, *Schalk*, and *Flores*, either taken alone or in combination, do not disclose or suggest the above-noted features of claim 1, from which claims 4 and 5 depend. *Rahim* and the allegedly well known prior art do not teach or suggest the above-noted features of claim 1, nor does the Examiner does not rely on these references for such teachings. Applicants therefore request that the Examiner reconsider

and withdraw the rejection of claims 4, 5, 10 and 11 under 35 § U.S.C. § 103(a) and allow these claims, as well.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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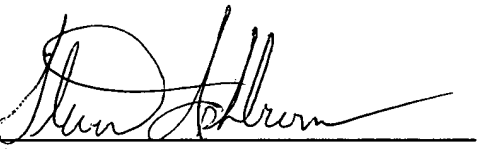
Dated: February 20, 2007

By: 

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